PRELIMINARY DESIGN – BRIDGE SUBMITTALS CHECKLIST

The following listing of design items is intended to serve as a general pre-submittal review tool for the consultant's convenience to identify typical MoDOT review items. This list is not intended to be all-inclusive. When this checklist is used, it is requested that a copy of the "checked" list be included with the submittals to MoDOT to assist in the reduction of review time required.

Preliminary submittals shall provide information to such an extent that all relevant design issues are identified prior to the beginning of the detailed final design phase. (See the documentation in **Section VIII** for additional information regarding general requirements). Preliminary Design Bridge Submittals shall consist of a Project Summary Report and Preliminary Design Drawings.

Please note that an extended listing of design items that are to be indicated with the Final Design Submittals is provided in the "Final Design – Bridge Submittals Checklist" (**Figure IX-3**). As much clarity as possible regarding the scope of design at the Preliminary design stage is recommended; therefore, the consultant may choose to show some of the additional items listed in the Final Design checklist at the Preliminary Submittals stage. As a minimum, however, the following information should be provided:

THE PROJECT SUMMARY REPORT

The Project Summary Report shall provide information pertaining to the following categories:

a) General project information
b) Design variance issues
c) The Hydraulic Report
d) The Geotechnical Investigation Report
e) Preliminary cost estimate (encouraged at this stage – see Page 3 of this Figure - but required at this stage if the estimated bridge cost is in excess of $500,000)

General Project Information

A brief general description of the project and summary of appropriate design issues is to be provided.

Design Variance Issues

A summary of issues for which a design variance is requested is to be provided. The Design Variance Request form should be provided as a separate attachment to allow for relay between appropriate MoDOT divisions for approval. Variances on some LPA Manual design criteria may be allowed, if provided appropriate justification in the Design Variance Request. Contact appropriate MoDOT personnel if in question.

The Hydraulic Report

For stream-crossing projects, the hydraulic portion of the summary report shall address those items critical to the hydraulic design and analysis of the proposed structure for the required design criteria as well as issues regarding the performance of the structure under design flooding conditions; such as the amount of freeboard to allow passage of drift material, frequency and depth of approach roadway overtopping, considerations of potential property damage during design conditions that might justify stricter design criteria, etc. It is intended that the information in this summary should also serve as a reference to the Local Agency for their future use. The following is a checklist of items to be provided in the Hydraulic Report at the Preliminary submittals stage:

PRELIMINARY DESIGN – BRIDGE SUBMITTALS CHECKLIST

Design and Analysis

___ The Hydraulic Summary Data Table (**Figure VIII-6**)
___ Summary of hydraulic design criteria used in determining the bridge or culvert opening requirements
___ Summary of investigations into applicable FEMA requirements
___ Summary of field investigations, observation of existing scouring conditions and reported historical flooding observations
___ Floodplain cross sections used in the hydraulic analysis
___ Plan view locations of the floodplain cross sections used in the hydraulic analysis
___ 2000 foot streambed profile (1000 feet upstream and downstream of the bridge)
___ The method used to determine the peak discharges
___ The drainage area and **"**valley slope**"**
___ The **"**streambed slope**"** used in the hydraulic analysis as well as the method in which the streambed slope was determined
___ Hydraulic analysis (Both data input and output from the computer analysis shall be provided.)
___ Backwater determination calculations
___ Scour analysis
___ Discussion regarding any hydraulic design criteria other than that listed in the LPA Manual which was considered in the hydraulic analysis; such as for:
  ___ Requirements to satisfy the FEMA National Flood Insurance Program regulations
    ___ Maximum backwater limitations
    ___ "No-rise" in 100-year water surface elevation for "floodway" crossings
    ___ High water elevation given in FEMA Flood Insurance Study due to backwater from nearby river (such as Missouri or Mississippi Rivers)
    ___ Copy of FEMA FIS information used for the hydraulic design
  ___ Other controlling hydraulic design criteria adopted by the Local Public Agency

Certifications and Design Variances

___ Completion of the Certification in **Figure VIII-8** regarding investigations into potential FEMA National Flood Insurance Program regulations applicable to the project (also see **Section VIII** "FEMA and Required Certifications")
___ Completion of the "No-Rise" certificate (signed and sealed) only when a FEMA-defined "**floodway**" is being crossed (or affected) by the proposed structure (see **Fig. VIII-5**)
___ If appropriate, a completed hydraulic design variance request with adequate justification (include as a separate attachment)

Performance/Community Issues

___ A summary of the freeboard risk analysis - considerations of historical drift problems at the site and determination of appropriate freeboard
___ Summary of any investigation into potential property damage during design flooding conditions
___ Summary of any safety-related hydraulic design issues and proposed methods of mitigating those concerns
___ Summary of information obtained from public hearings regarding the project, particularly for projects involving a new low water crossing or low water bridge.

PRELIMINARY DESIGN – BRIDGE SUBMITTALS CHECKLIST

Geotechnical Investigation Report
See **Section VIII**, "Geotechnical Investigations" for required information.

Preliminary Cost Estimate
An estimated bridge cost in excess of $500,000 requires that a cost estimate of various types of structures be provided with the Preliminary submittals to show appropriate economical comparisons have been considered. It is also beneficial that a preliminary cost estimate (and cost comparison of structural alternates, when appropriate) be provided with the Preliminary submittals on a general basis.

PRELIMINARY DRAWINGS (half-size drawings, 11" x 17" to be submitted to MoDOT)

The Title Sheet
___ The federal project number
___ County
___ Route
___ The **NEW** Structure number
___ Name of Local Public Agency (if different from the County)
___ Name of stream, roadway or RR being crossed
___ Brief description of work to be performed (i.e.; bridge replacement or rehabilitation)
___ Functional classification of the route (as will also be reported on the SI&A Sheet)
___ Project location map (preferably shown on a county map) with North arrow
___ The section, township and range of the project site
___ Current and design year ADT (also indicate design year)
___ Percentage of truck traffic (design year)
___ Current and design speed limits
___ Directional distribution of traffic, if appropriate
___ A legend to identify abbreviations and symbols used in the drawings
___ The name, address and phone number of the consultant
___ The date of the drawings (should also be shown on each sheet in case of revisions)

General Notes, Foundation and Soil Boring Data
___ General notes regarding:
- ___ Design specifications
  - ___ **2002** AASHTO *Standard Specifications for Highway Bridges*, 17th Edition
- ___ Design loading
  - ___ Design vehicle loading
  - ___ Seismic Performance Category and Acceleration Coefficient
- ___ Construction and Materials specifications
  - ___ Missouri Standard Specifications for Highway Construction, 1999 (or latest edition) and current Supplemental Specification revisions

___ Pile data table (at Preliminary stage, show type, number and estimated length of pile)
___ Design bearing table for footings with preliminary data
___ Soil boring log data and elevations of adequate hard rock as obtained from the geotechnical investigation

Plans and Profiles Sheets

PRELIMINARY DESIGN – BRIDGE SUBMITTALS CHECKLIST

Drawing requirements at the Preliminary Submittals stage vary depending upon the type of structure. Likewise, some variations may also exist in the Project Summary Report requirements. A separate checklist is provided for each of the following project types.

a) New bridge over stream, **see Fig. VIII-7-5**
b) New culvert, **see Fig. VIII-7-6**
c) New bridge over road, **see Fig. VIII-7-7**
d) New bridge over railroad, **see Fig. VIII-7-8**
e) Rehabilitated bridge, **see Fig. VIII-7-9**
f) New low water crossing, **see Fig. VIII-7-9**
g) Structural retaining wall, **see Fig. VIII-7-10**
h) Pedestrian bridge, **see Fig. VIII-7-10**

PRELIMINARY DESIGN – BRIDGE SUBMITTALS CHECKLIST

New Bridge Over Stream

Preliminary drawings shall contain the following information:

___ Existing and proposed roadway alignments
___ Location of existing bridge and other structures
___ Significant topographic features
___ Existing utilities
___ Stream alignment and direction of flow
___ Proposed channel realignment (if needed)
___ Roadway typical sections and pavement type
___ Indication of the vertical datum
___ Guardrail layout (and identification of end terminals, as appropriate)
___ Roadway width transitions
___ Superelevation transition requirements, if applicable
___ Proposed roadway and bridge grades
___ The fill face stations of the proposed bridge ends
___ Identification of bridge "skew" to stream alignment
___ Superstructure type and spans
___ Bridge cross section showing:
    ___ C/L of roadway
    ___ Location of profile grade
    ___ Crown location and cross slopes on bridge deck
    ___ Girder spacing
    ___ Type of barrier railing system
        ___ Does the barrier railing system satisfy the required crash test "TL" criteria?
        ___ Show width, height and "TL" capacity of barrier railing
    ___ Clear width on bridge roadway and on sidewalk or pedestrian/bike path
    ___ Pedestrian railing/fencing, when applicable
___ Existing ground line profile elevations at C/L of roadway and parallel to and approximately 30' offset from the centerline of roadway
___ Plan view location of soil borings
___ Foundation types and locations of bottom of footings and piles
___ Extents of rock blanket embankment protection
___ Indication of berm elevations, when applicable
___ Hydraulic Summary Data Table (See **Fig. VIII–6**) shown on drawing
___ Design high water elevation shown on bridge profile drawing
___ Approximate low water elevation shown on bridge profile drawing (water surface elevation for 2-Year flood recommended)

PRELIMINARY DESIGN – BRIDGE SUBMITTALS CHECKLIST

New Culvert

Preliminary drawings shall contain the following information:

___ Existing and proposed roadway alignments
___ Location of existing bridge and other structures
___ Significant topographic features
___ Existing utilities
___ Stream alignment and direction of flow
___ Proposed channel realignment (if needed)
___ Roadway typical sections and pavement type (and driveways, if applicable)
___ Indication of the vertical datum
___ Guardrail layout (and identification of end terminals, as appropriate)
___ Roadway width transitions
___ Superelevation transition requirements, if applicable
___ Proposed roadway grades
___ The fill face stations of the proposed culvert along C/L of roadway
___ Identification of C/L of culvert "skew" to roadway alignment
___ Culvert cross section showing number and size of cell openings
___ Roadway cross section at culvert showing:
- ___ C/L of roadway
- ___ Location of profile grade
- ___ Crown location and cross slopes on roadway
- ___ Location of headwalls with respect to C/L of roadway
- ___ Type of barrier railing system, when appropriate
  - ___ Are the headwalls of the culvert located beyond the clear zone?
  - ___ Does the barrier railing system (if required) satisfy the required crash test "TL" criteria?
  - ___ Show width, height and "TL" capacity of barrier railing (if applicable)
- ___ Clear width on roadway above culvert
- ___ Pedestrian railing/fencing, when applicable

___ Existing ground line profile elevations at C/L roadway and parallel to and approximately 30' offset from the centerline of roadway
___ Plan view location of soil borings (when appropriate)
___ Bottom elevation of culvert walls when keyed into rock
___ Extents of rock blanket embankment protection, when appropriate
___ Hydraulic Summary Data Table (See **Fig. VIII–6**) shown on drawing
___ Design high water elevation shown on the culvert cross section
___ Approximate low water elevation shown on the culvert cross section (water surface elevation for 2-Year flood recommended)
___ Flow line elevations at each end of the culvert shown on the culvert cross section

PRELIMINARY DESIGN – BRIDGE SUBMITTALS CHECKLIST

New Bridge Over Road

Preliminary drawings shall contain the following information:

___ Existing and proposed roadway alignments
___ Location of existing bridge and other structures
___ Significant topographic features
___ Existing utilities
___ Roadway typical sections and pavement type (and driveways, if applicable)
___ Indication of the vertical datum
___ Guardrail layout (and identification of end terminals, as appropriate)
___ Roadway width transitions
___ Superelevation transition requirements, if applicable
___ Proposed roadway and bridge grades
___ The fill face stations of the proposed bridge ends
___ Identification of bridge "skew" to roadway alignment
___ Superstructure type and spans
___ Bridge cross section showing:
    ___ C/L of roadway
    ___ Location of profile grade
    ___ Crown location and cross slopes on bridge deck
    ___ Girder spacing
    ___ Type of barrier railing system
        ___ Does the barrier railing system satisfy the required crash test “TL” criteria?
        ___ Show width, height and “TL” capacity of barrier railing
    ___ Clear width on bridge roadway and on sidewalk or pedestrian/bike path
    ___ Pedestrian railing/fencing, when applicable
___ Existing ground line profile elevations at C/L roadway and parallel to and approximately 30' offset from the centerline of roadway
___ Horizontal and vertical clearances
___ Plan view location of soil borings
___ Foundation types and locations of bottom of footings and piles
___ Type of embankment protection, if needed

PRELIMINARY DESIGN – BRIDGE SUBMITTALS CHECKLIST

New Bridge Over Railroad

In addition to other items indicated above, the **Project Summary Report** shall also contain the following information:

___ Vertical and horizontal clearances requirements by the railroad company
___ Other design requirements established by the railroad company
___ **Railroad review comments regarding preliminary drawings (RR company approval of the preliminary layout is required prior to MoDOT approval of Preliminary bridge submittals)**

Preliminary drawings shall contain the following information:

___ Existing and proposed roadway alignments
___ Location of existing bridge and other structures
___ Significant topographic features
___ Existing utilities
___ Alignment of the railroad
___ Profile showing top of rail elevations along RR track
___ Roadway typical sections and pavement type (and driveways, if applicable)
___ Indication of the vertical datum
___ Guardrail layout (and identification of end terminals, as appropriate)
___ Roadway width transitions
___ Superelevation transition requirements, if applicable
___ Proposed roadway and bridge grades
___ The fill face stations of the proposed bridge ends
___ Identification of bridge "skew" to railroad alignment
___ Superstructure type and spans
___ Bridge cross section showing:
    ___ C/L of roadway
    ___ Location of profile grade
    ___ Crown location and cross slopes on bridge deck
    ___ Girder spacing
    ___ Type of barrier railing system
        ___ Does the barrier railing system satisfy the required crash test "TL" criteria?
        ___ Show width, height and "TL" capacity of barrier railing
    ___ Clear width on bridge roadway and on sidewalk or pedestrian/bike path
    ___ Pedestrian railing/fencing, when applicable
___ Existing ground line profile elevations at C/L roadway and parallel to and approximately 30' offset from the centerline of roadway
___ Horizontal and vertical clearances
___ Plan view location of soil borings
___ Foundation types and locations of bottom of footings and piles
___ Type of embankment protection, if needed

PRELIMINARY DESIGN – BRIDGE SUBMITTALS CHECKLIST

Rehabilitated Bridge

In addition to the appropriate items identified above, the **Project Summary Report** shall contain the following information (also needed when the structure is to be replaced – but eligible only for rehabilitation, or "partial", funding):

___ Define all deficiencies for existing bridge
___ Describe locations for improvements
___ Describe level of improvement
___ Conceptual estimation of load capacity improvement
___ Results of the hydraulic and scour investigations
___ Estimated cost of improvements

Preliminary drawings shall contain the following information:

___ Bridge superstructure type
___ Bridge foundation repair concept, as appropriate
___ Type of barrier railing system (must be upgraded to current "TL" requirements)
    ___ Show width, height and "TL" capacity of barrier railing

New Low Water Crossing or Low Water Bridge

Preliminary drawings shall contain the following information:

___ Existing and proposed roadway alignments
___ Location of existing bridge and other structures
___ Significant topographic features
___ Existing utilities
___ Stream alignment and direction of flow
___ Proposed channel realignment (if needed)
___ Roadway typical sections and pavement type (and driveways, if applicable)
___ Indication of the vertical datum
___ Guardrail layout (and identification of end terminals, as appropriate)
___ Roadway width transitions
___ Superelevation transition requirements, if applicable
___ Proposed roadway and bridge grades
___ The fill face stations of the proposed bridge ends
___ Identification of bridge "skew" to stream alignment
___ Superstructure type and spans
___ Traffic signing
___ Bridge cross section showing:
    ___ C/L of roadway and location of profile grade
    ___ Crown location and cross slopes on bridge deck
    ___ Girder spacing, as applicable
    ___ Low water bridge curb
___ Existing ground line profile elevations parallel to and approximately 30' offset from the centerline of roadway
___ Plan view location of soil borings
___ Foundation types and locations of bottom of footings and piles
___ Extents of rock blanket embankment protection
___ Hydraulic Summary Data Table (See **Fig. VIII–6**) shown on drawing
___ Design high water elevation shown on bridge profile drawing
___ Approximate low water elevation shown on bridge profile drawing (2-Year WSEL recommended)

PRELIMINARY DESIGN – BRIDGE SUBMITTALS CHECKLIST

Structural Retaining Walls

A **Project Summary Report** will generally not be required for structural retaining wall projects, except as appropriate to summarize unusual conditions.

Preliminary drawings shall contain the following information:

___ Location of wall on plan view
___ Wall cross section
___ Cross sections of existing/proposed groundline at regular intervals along the length of the proposed wall
___ Top and bottom of wall elevations
___ Location of soil borings
___ Soil boring log data
___ MSE walls should be considered for walls over 6' (2m) in height

Pedestrian Bridges

A **Project Summary Report** for pedestrian bridge projects shall provide a brief description of the project and include hydraulic report and geotechnical investigation. (Projects in zones subject to 100-year flooding per a FEMA Flood Insurance Study will require the same considerations as described in Section VIII of the LPA Manual for other stream crossing structures).

Preliminary drawings shall contain the following information.

___ Minimum Design Criteria based on the current edition of the following publications:
  ___ Guide for the Development of Bicycle Facilities, by AASHTO.
  ___ Guide Specifications for the Design of Pedestrian Bridges, By AASHTO.
___ Type of span bridges
  ___ Prefabricated
    ___ A minimum of three alternate suppliers indicated in Specifications
  ___ Built in place
___ Design Loads (and Maintenance Vehicular Load, if any)
___ Layout of the structure
___ The grades across the structure
  ___ Grades shall meet the ADA requirements for wheelchairs.
___ Width provisions
  ___ Pedestrian only - For normal volumes provide 5 foot clear between the pedestrian rail or fence. For sidewalks on bridges, provide 5 foot clear between the vehicular barrier and the pedestrian rail or fence. This is normally detailed as a cantilever sidewalk with no additional girder line.
  ___ Pedestrian/bikeway - For normal volume, provide 10 foot clear between the bike rails. For trails on bridges, provide 10 clear between the vehicular barrier and the pedestrian rail or fence.
  ___ Pedestrian/bikeway - Provide 10 foot vertical clearance above the riding surface of the pedestrian/bikeway structure.
___ Geotechnical Investigations
  ___ Foundation types and locations of bottom of footings and piles
  ___ Soil boring log
___ Critical horizontal and vertical clearances to be indicated